APPENDIX A

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Claim 3. A method for binding a DNA binding polypeptide of the Cys2 His2 zinc finger class to a DNA triplet in a target DNA sequence comprising 5-meC as the central residue in the target DNA triplet, the method comprising preparing a DNA binding polypeptide of the Cys2 His2 zinc finger class to bind to the DNA triplet, wherein binding to the 5-meC residue by an α-helical zinc finger DNA binding motif of the polypeptide is achieved by placing an Ala residue at position +3 of the α-helix of the zinc finger, and exposing the DNA binding polypeptide to the target DNA sequence, whereby the DNA binding polypeptide binds to the target DNA sequence.

Claim 4. A method for binding a DNA binding polypeptide of the Cys2 His2 zinc finger class to a DNA triplet in target DNA sequence comprising 5-meC, but not to an identical triplet comprising unmethylated C, the method comprising preparing a DNA binding polypeptide of the Cys2 His2 zinc finger class to bind to the triplet comprising 5-meC, wherein binding to each base of the triplet by an α-helical zinc finger DNA binding motif in the polypeptide is determined as follows:

a) if the 5' base in the triplet is G, then position +6 in the α-helix is Arg or position ++2 is Asp, or position +6 in the α-helix is Arg and position ++2 is Asp;

b) if the 5' base in the triplet is A, then position +6 in the α-helix is Gln or Glu and ++2 is not Asp;

c) if the 5' base in the triplet is T, then position +6 in the α-helix is Ser or Thr and position ++2 is Asp; or position +6 is a hydrophobic amino acid other than Ala;

d) if the 5' base in the triplet is C, then position +6 in the α-helix is any amino acid, provided that position ++2 in the α-helix is not Asp;

e) position +3 in the α-helix is Ala;

f) if the 3' base in the triplet is G, then position -1 in the α-helix is Arg;

g) if the 3' base in the triplet is A, then position -1 in the α- helix is Gln and position +2 is Ala;

h) if the 3' base in the triplet is T, then position -1 in the α-helix is Asn; or position -1 is Gln and position +2 is Ser;

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i) if the 3' base in the triplet is C, then position -1 in the α-helix is Asp and Position +l is Arg; and

exposing the DNA binding polypeptide to the target DNA sequence, whereby the DNA binding polypeptide binds to the target DNA sequence.

Claim ~~23~~ 3. The method according to claim ~~3 or 4~~ 1 or 2, wherein the binding protein comprises two or more zinc finger binding motifs.

Claim ~~25~~ 4. The method according to claim ~~23~~ 3, wherein the DNA binding protein is constructed by recombinant DNA technology, the method comprising the steps of:

a) preparing a DNA coding sequence encoding two or more zinc finger binding motifs;

b) inserting the DNA sequence into a suitable expression vector; and

c) expressing the DNA sequence in a host organism in order to obtain the DNA binding protein.

Claim ~~26~~ 5. The method according to claim ~~3 or 4~~ 1 or 2 further comprising the steps of subjecting the DNA binding protein to one or more rounds of randomization and screening in order to improve the binding characteristics thereof.

Claim ~~28~~ 6. The method of either of claims ~~3 or 4~~ 1 or 2, further comprising detecting the DNA binding polypeptide binding to the target DNA sequence.

Claim ~~29~~ 7. The method of either of claims ~~3 or 4~~ 1 or 2, wherein the binding of the DNA binding polypeptide to the target DNA sequence regulates transcription of a gene.